

REMARKS

Claims 3 - 8, 11 - 21, and 23 are in the application.

Claims 9 and 10 have been cancelled without prejudice to presentation in a continuing application, and claims 26 and 27 were previously withdrawn due to the Examiner's restriction requirement.

Independent claim, claim 3, has been amended to require that the algaecidal material comprise cuprous oxide, a limitation previously expressed in cancelled claim 9. As explained in the accompanying Rule 132 declaration, including cuprous oxide in the inner layer results in algae resistant granules that are dark in color. The amended independent claim is fully supported by the application as filed, and introduces no new matter.

Claims 3-11, 16-21, and 23 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 3,528,842 ("Skadulis") in view of U.S. Patent 4,378,408 ("Joedicke"). This rejection is respectfully traversed, and reconsideration and withdrawal of the rejection are respectfully requested as applicable to the amended claims.

The Examiner states that she is applying Skadulis for the same reasons as forth in paragraph 2 of the Office Action mailed on March 2, 2006. Specifically, the Examiner states that Skadulis teach raw mineral granules, which she identifies with the claimed inert base particles (referencing column 3, lines 44-46), coated with a first layer containing algaecidal copper compounds, which the Examiner identifies with the claimed first intermediate particles (referencing column 5, lines 20), and a second layer, which the Examiner identifies with the claimed first intermediate particles having containing pigments such as TiO₂ (referencing column 5, lines 30).

The Examiner notes that Skadulis fails to teach that first layer further contains a void-forming material that release gaseous material at temperatures above 90°C, and have an average particle size no larger than 2 mm, which form pores upon firing, and the second layer does not have a void-forming material (referencing Claim 3).

The Examiner further states that Joedicke '408 teaches that the addition of inexpensive gas-forming compounds such as hydrogen peroxide, sodium perborate (NaBO_3) to a coating composition, containing a pigment such as titanium dioxide (TiO_2) and a binder formed from kaolin clay and sodium silicate, greatly enhances film opacity and afford significant pigment reductions, particularly TiO_2 in whites, where the coating composition is intended to be used in coatings on roofing granules, by undergoing chemical and/or thermal decomposition to gaseous products early in the film drying process and resulting in the uniform dispersion of microscopic light-scattering microvoids (i.e. gas-forming particles should have claimed particle size of less than 2 mm to produce microvoids) throughout the film (referencing column 2, lines 17-68; column 3, lines 1-16). The Examiner further notes that granules may be coated in one or more coats with any desired amount of coating material and gas-forming compound may be used in any one or more of the coatings (referencing column 5, lines 38-41).

The Examiner concludes that Joedicke '408 teaches that roofing granules may be coated in multiple coats with any desired amount of coating material and gas forming compound may be used in any one of multiple coatings to greatly enhance film opacity and afford significant pigment reductions, particularly TiO_2 in whites.

The Examiner further concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have added inexpensive gas-forming compounds such as hydrogen peroxide, sodium perborate (NaBO_3) to an

algaecidal coating composition for making a first coating layer on roof granules in Skadulis with the expectation of providing algaecidal roof granules with the desired enhanced film opacity and significant pigment reductions, because Joedicke '408 teaches that roofing granules may be coated in one or more coats with any desired amount of coating material and gas-forming compound may be used in any one of multiple coatings to greatly enhance film opacity and afford significant pigment reductions, particularly TiO₂ in whites.

As to pore size, thickness and concentration limitation, the Examiner notes that it has been held that it is not inventive to discover the optimum or workable ranges of variables by routine experimentation, citing In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977), and In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Thus, the Examiner further concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have determined the optimum values of the relevant pore size/ thickness and concentration parameters (including those of claimed invention) in Skadulis in view of Joedicke '408 through routine experimentation in the absence of showing of criticality.

In response to Applicants' arguments filed July 12, 2006, the Examiner noted that applicants had argued that the rejection mailed on March 2, 2006 would not be applicable to the amended claims, which required that the outer coating layer be free of void-forming material. The Examiner further acknowledged that Applicants had argued that since the postulated motivation to add the void-forming materials to the coating compositions was to create light-scattering microvoids, one of ordinary skill in the art would not be motivated by the cited combination of prior art references to add a void-forming material to the inner coating layer of a roofing granule having an inner coating

layer and an outer layer, since the inner layer would be concealed by the pigmented outer layer. The Examiner stated that she respectfully disagreed with this argument because Joedicke '408 teaches that roofing granules may be coated in multiple coats with any desired amount of coating material and gas-forming compound may be used in any one of multiple coatings to greatly enhance film opacity and afford significant pigment reductions, particularly TiO₂, in whites (referencing column 5, lines: 38-41).

Applicants respectfully disagree with the Examiner's statement of Joedicke '408's teaching and ultimate conclusion, in particular as applicable to the amended claims. While the Examiner is correct that Joedicke '408 does in fact disclose that granules may be coated in one or more coats with any desired amount of coating material and gas forming compound may be used in any one or more of the coatings, Joedicke does not disclose or suggest that the use of gas-forming compound in an interior coat will result in either greatly enhanced film opacity or significant pigment reductions. A person coating roofing granules would understand Joedicke '408's teaching filtered through that person's ordinary skill in the art and common sense. Thus, one of ordinary skill in the art would understand that creating microvoids in an interior layer might or might not contribute to enhanced film opacity and might or might not permit a reduction in expensive hiding pigments, in particular, titanium dioxide, depending on the composition of layers on the outside of the microvoid-containing interior layer. For example, if the exterior layer is transparent and pigment-free, the micro-void containing interior layer could contribute substantially to light-scattering and the opacity of the multiple layer coating system. Conversely, if the exterior layer includes a substantial amount of light-scattering pigment, such as titanium dioxide, then there will be little if any light that penetrates through to the micro-void containing interior layer, and little if any light

scattering will occur in the interior layer by the microvoids. Neither of these scenarios is inconsistent with or contradicted by Joedicke '408's disclosure.

As noted in the accompanying Rule 132 declaration at paragraph 7, one of ordinary skill in the art would understand that the effectiveness of microvoids created by gas-forming compounds such as sodium perborate in enhancing the opacity of a multiple layer coating would depend on several parameters, including (1) the specific layer in which the microvoids were created, (2) the composition of the microvoid-carrying layer, as well as (3) the existence of one or more layers exterior to the microvoid-carrying layer and their respective compositions. As further noted in the declaration, while the presence of microvoids in an interior layer coated with a clear, pigment-exterior layer could contribute significantly to the opacity of the entire composition, to the extent the exterior layer or layers includes pigments, the contribution to the opacity of the entire coating composition from microvoids present in interior layers becomes correspondingly less significant. As noted, the pigmented outer layer or layers would necessarily mask or hide the inner layer, so that light scattering is diminished or extinguished entirely.

Thus, one of ordinary skill in the art would not be provided any suggestion or incentive by Joedicke '408 to add gas-forming material to an interior coating layer for a roofing granule where the exterior layer itself contained a significant amount of light-scattering pigment, such as titanium dioxide.

Similarly, one of ordinary skill in the art would find Joedicke '408 largely irrelevant to the preparation of dark-colored roofing granules. Whereas light- or white- colored roofing granule coatings include materials such as titanium dioxide that reflect light, dark colored roofing granule coatings include material that absorb rather than reflect light, hence the dark color.

Conventional algae-resistant roofing granules typically include materials in the granule coatings that provide the granules with a dark color, as can be seen in Exhibits A and B to the Rule 132 declaration accompanying this amendment. These material safety data sheets for conventional algae-resistant roofing granules disclose that the granule include both copper oxide and carbon black, pigments which one of ordinary skill in the art would understand to contribute to a dark appearance. This understanding is confirmed by the data presented in paragraph 5 of the accompanying Rule 132 declaration.

The claims of the present application have been amended to require that the roofing granules include cuprous oxide, which will provide the roofing granules with a dark color. This is shown in the accompanying Rule 132 declaration at paragraph 4, where it is noted that when a coating composition is including cuprous oxide is "cured" at an elevated temperature, the cuprous oxide confers a dark brown color on the granules.

As further noted in the accompanying Rule 132 declaration, when color readings were taken for the colored algae-resistant granules produced following the procedure of Example 6 of the application, using a HunterLab XE spectrometer, the results obtained were $L^*=23.09$; $a^*=4.30$; and $b^*=2.68$. An L^* value of 23.09 represents a very dark colored material. Thus, in this case pigment reduction would provide no benefit, and one of ordinary skill in the art would not be motivated by Joedicke '408 to reduce the level of pigment.

Further, as noted in the accompanying Rule 132 declaration at paragraph 6, one of ordinary skill in the art would not be motivated to add a void-forming material such as hydrogen peroxide or sodium perborate to the inner coating composition material in the process of the present invention, because increasing the "opacity" of the coating

composition would require additional pigment, rather than less as in the case of white or light-colored materials, and would not improve the appearance of the granules.

Thus, applicants respectfully contend that the cited combination of references does not make out a *prima facie* case of obviousness with respect to the presently claimed invention. Even were one of ordinary skill in the art to combine the references as suggested by the Examiner, the combination would not read upon the amended claims.

Reconsideration and withdrawal of the rejection of claims 1-11 and 16-25 entered under 35 U.S.C. 103(a) over Skadulis in view of Joedicke '408, as applicable to the amended claims, are respectfully requested for this reason.

Claims 9, 12 and 13 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over Skadulis in view of Joedicke '408, further in view of U.S. Patent 3,507,676 ("McMahon"). This rejection is also respectfully traversed, and reconsideration and withdrawal of the rejection are respectfully requested as applicable to the amended claims. The Examiner states that Skadulis in view of Joedicke '408 are applied in this rejection for the same reasons as in paragraph 3 of the Office Action mailed March 2, 2006.

In the earlier action, the Examiner noted that Skadulis in view of Joedicke '408 fails to teach that zinc oxide is used as an algicidal agent, and further stated that McMahon teaches that ZnO is suitable for the use as algaecide in the coating of roofing granules (referencing column 1, lines 14-15). In that action, the Examiner also noted that it has been held that the selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). In that action, the Examiner

concluded that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used ZnO as algaecide in Skadulis in view of Joedicke '408 since McMahon teaches that ZnO is suitable for the use as algaecide in coating of roofing granules.

Once again, applicants respectfully contend that the cited combination of references does not make out a *prima facie* case of obviousness with respect to the presently claimed invention. Even were the references combined as suggested by the Examiner, there would be nothing to teach or suggest to one of ordinary skill in the art to include void-forming material in the inner coating layer but not in the outer coating layer of dark colored roofing granules containing cuprous oxide. McMahon does not add anything to the combination of Skadulis in view of Joedicke '408 in this regard. Accordingly, reconsideration and withdrawal of the rejection of claims 9, 12 and 13 entered over Skadulis in view of Joedicke and McMahon, as applicable to the amended claims, are respectfully requested for this reason.

Claims 14 and 15 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over Skadulis in view of Joedicke '408, and further in view of U.S. Patent 4,430,108 ("Hojaji et al.") for the reasons of record set forth in paragraph 4 of the Examiner's Action mailed March 2, 2006. This rejection is respectfully traversed, and reconsideration and withdrawal of the rejection are respectfully requested as applicable to the amended claims. In the Examiner's Action of March 2, 2006, the Examiner stated that Skadulis in view of Joedicke '408 were being applied in this rejection for the same reasons as above in the first rejection. The Examiner further noted that Skadulis in view of Joedicke '408 fails to teach that sugar is to be used as a gas-forming material. However, the Examiner stated that Hojaji et al. teach that sugar is suitable for the use as

a gas-forming material (referencing column 8, lines 47-57) in glass compositions for roof shingles (referencing column 4, lines 19-20). The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a sugar as gas-forming material in Skadulis in view of Joedicke '408 since Hojaji et al. teach that sugar is suitable for the use as gas-forming material in glass compositions for roof shingles.

However, applicants respectfully contend that Hojaji et al. does not supply the teaching or suggestion missing from the combination of Skadulis and Joedicke '408, that void-forming material be included in the inner layer composition but excluded from the outer layer composition in a dark-colored composition including cuprous oxide. Consequently, the cited combination of prior art references does not make a *prima facie* case of obviousness of the claims as presently amended.

Reconsideration and withdrawal of the rejection of claims 14 and 15 over Skadulis in view of Joedicke '408 and Hojaji et al. are respectfully requested for this reason.

Applicants respectfully solicit reconsideration, withdrawal of the rejections entered, and an early notice of allowance.